Identifying tacit knowledge used by secondary school teachers

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entitled

Identifying Tacit Knowledge Used by Secondary School Teachers

by

Lauren R. Hurst

Submitted to the Graduate Faculty as partial fulfillment of the requirements for

the Master of Education Degree in Educational Psychology

Dr. Thomas G. Dunn, Committee Chair

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The University of Toledo

May 2010
An Abstract of

Identifying Tacit Knowledge Used by Secondary School Teachers

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Lauren R. Hurst

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Twenty nine experienced secondary school teachers from several area suburban schools were interviewed about situations regarding classroom management or classroom discipline. The purpose of this study was to learn more about the tacit knowledge used by these teachers in classroom management. Many teachers were often unaware of the automaticity with which they reacted or applied their knowledge to classroom situations. Identifying tacit knowledge may help teachers focus experience and advice provided to novice teachers in their schools.
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Chapter 1

Introduction

Eric is known by all of his classmates as being likely to display emotional outbursts at any time. He has been in school with the same students since kindergarten, but was also in an alternative school setting for his sixth grade year due to behavioral circumstances that warranted his removal from the normal school setting. He was placed back in his regular school setting beginning in seventh grade. The junior high years were bumpy, but the administration worked with the teachers, parents, and Eric to make the years as normal as possible for him.

A meeting was held at the beginning of the school year for all of Eric’s freshman teachers to explain Eric’s emotional issues and how his behaviors had been handled in the junior high setting. With that done, Eric began his high school classes with a paraprofessional familiar with his behaviors who was assigned to attend all of Eric’s classes. Mrs. Humphrey, Eric’s Biology teacher, had heard about Eric, but she had never “seen him in action” in any school setting. On the second day of class, students were paired with a lab partner – an activity that was met with agreement for all students except Eric. Eric began screaming, throwing his books, and yelling at Mrs. Humphrey for putting him with such a jerk of a lab partner. Eric then stormed out of the room. Mrs. Humphrey quickly asked the paraprofessional to stay in the classroom with her students while she went in search of Eric. When Mrs. Humphrey found Eric down the hall, she spoke in a very calm and soft voice asking him to please settle down so they could talk.
about the situation. She sat with him on a bench in the main hall to discuss what had happened and how they could solve the problem.

When Eric was calm (he had been crying, also), Mrs. Humphrey walked him to the office so that he could have a place to relax and talk about the situation further with the assistant principal. He was told that he was not being punished and that perhaps the assistant principal (who knew his behaviors well) could call home to get him some further help.

Mrs. Humphrey would not have been able to react the same way in another situation in which there was not a second adult in the room. She most likely would not have reacted the same way with another student. Also, it is obvious that Mrs. Humphrey was not made aware of any past issues with the assigned lab partner. If Mrs. Humphrey had been briefed beforehand of any concerns with classmates, she would have used that information when assigning partners. She decided to carry out her strategy with Eric because she knew of his past behaviors, knew she had adult assistance for her other students, and felt comfortable approaching Eric in the hallway. Walking Eric to the office was a wise decision, instead of bringing him back into the classroom, because that gave Eric a chance to decompress his thoughts and gave Mrs. Humphrey time to address any concerns with the rest of the class without Eric being present when she returned.

When Mrs. Humphrey returned to the class, the other students were all talking about Eric’s outburst. Mrs. Humphrey settled them down and very briefly told them about her conversation with Eric. The incident was set aside and class resumed from where Mrs. Humphrey had left.
No one person taught this teacher how to carry out this form of behavior management; she made a judgment call based on prior experiences that enabled her to make quick decisions regarding what to do to minimize the present possible danger to the student and others. Mrs. Humphrey was utilizing a form of intuition or knowledge known as tacit knowledge.

Tacit knowledge is a phrase coined by Michael Polanyi in his book *Personal Knowledge* (1958), which characterizes knowledge used by those who act and make judgments and who often have no explicit theory of their work – they simply know how to perform skillfully. The knowledge is a source of competence and offers an advantage in any situation. Tacit knowledge can be described as a “know how” to accomplish a task versus a “know what” or “know-why,” which is more likely to be explicit (taught) knowledge. Polanyi (1967), whose original training was in medicine and physical chemistry, used the words tacit knowledge to describe cognition that moves from the implicit to the explicit. He believed that individuals can not completely articulate tacit knowledge because it is based on bodily and communal realities and not concepts. He also stated that tacit knowledge functions as background knowledge that assists in accomplishing tasks, and varies from one situation to another. With that said, tacit knowledge is difficult to document, communicate, describe, replicate, or imitate because it is a result of human experience. Such skills cannot be learned from a textbook or even a class, but only through years of mentoring and experience.

According to Reber (1993), Polanyi argued effectively for the importance of tacit knowledge, knowledge whose origins and essential epistemic contents were simply not part of one’s ordinary consciousness but part of repeated experience. Tacit (implicit)
knowledge or learning should be examined in a setting in which the acquisition (of the tacit knowledge) process is unlikely to have been contaminated by previous learning from books or individuals (Reber, 1993).

Robert Sternberg and his colleagues have written extensively about tacit knowledge. Sternberg (1998) described tacit knowledge as having three components. First and foremost, tacit knowledge is procedural and is comprised of condition-action sequences. Such conditions refer to particular situations or classifications of situations. Tacit knowledge involves recognition of conditions and subsequent execution of action sequences. Such procedures are often automatic and are not accompanied by careful deliberation. Next, tacit knowledge is practically useful in that it helps people attain goals that they value. This is knowledge that is used in real-life situations rather than context-free knowledge used in artificial situations. Finally, tacit knowledge is not acquired with direct help from others, nor from direct instruction. Tacit knowledge is action-oriented knowledge that allows individuals to regulate their environment in ways to achieve certain goals (Nestor-Baker & Hoy, 2001).

The use of the tacit knowledge construct in this paper rests heavily on Sternberg’s (1999) three-pronged theory of human intelligence. According to Sternberg (1999), tacit knowledge is a key to intelligent behavior in practical situations or settings. That knowledge is the practical know-how that a person (in this case, teacher) needs in order to succeed. Horvath (1999) explains tacit knowledge as a natural concept that refers to knowledge that has been shown in previous research to be useful in predicting performance in real-world endeavors. According to the research reported by Reber
(1993) and Horvath (1999), tacit knowledge may be acquired without intention or awareness.

Tacit knowledge is knowledge that people may not know they have or may find difficult to articulate according to Horvath (1999). This knowledge often must be inferred from actions and statements. According to Horvath (1999), tacit knowledge is both the product of more general knowledge-acquisition abilities and an important predictor of competent performance in practical contexts. In other words, tacit knowledge is knowledge acquired through personal experience rather than received from others through instruction. The tacit knowledge construct, according to Horvath (1999), is a cognitive phenomenon defined in terms of the learning processes that produce the knowledge and the memory system that then encodes it for later use. To again emphasize the key points, tacit knowledge has three characteristics: tacit knowledge is related to an action, it is relevant to the goals people want, and it is acquired with little help from other people. People find this type of knowledge difficult to explain to others.

The explanation of tacit knowledge leads to another area known as expertise. “Know-how” or embodied knowledge are characteristics of the expert who acts, makes judgments, and so forth without explicitly reflecting on the principles or rules involved. Polanyi (1967) stated that knowing-what and knowing-why, by contrast, involve consciously accessible information that can be expressed and are typical of the person learning a skill by direct instruction and reading of rules. While such knowledge might be needed in order to acquire skills, it is no longer necessary for the skills to be practiced once the novice becomes an expert in exercising them. The expert works without having a theory; he simply performs with skill (Reber, 1993). When people acquire a skill, they
acquire a subsequent understanding that defies verbalization. Thus, the skills of a master, or expert, are difficult to codify, document, communicate, or replicate because they are the result of human experience and human senses. Tacit knowledge has not been learned from a textbook or even in a class, but only through years of experience.

This study is a replication of a former study about tacit knowledge in classroom management conducted by Dunn and Lozinski (2005). Their study focused on middle school teachers while this study will involve the use of tacit knowledge by secondary classroom teachers.

The purpose of this paper is to identify and learn more about tacit knowledge used by secondary teachers in classroom behavior management. Sternberg (1998) has conducted studies of tacit knowledge in various professions. This study may offer comparisons to others’ uses of tacit knowledge in various walks of life, but the intent rests solely with that of school teachers in senior high school settings who have taught for more than eight years.
Chapter 2

Literature Review

The word “tacit” was first used in 1595-1605 in reference to something unvoiced or unspoken, as in a *tacit prayer* (Random House, 2001). Later the definition “understood without being openly expressed; implied” was added. The word “knowledge” dates back to 1250-1300 and means an acquaintance with facts, truths, or principles as by study or experience (Random House, 2001). Scientist and philosopher Michael Polanyi (1958) first put the two words together to describe a process – *tacit knowing* and not a form of knowledge. There has been research about tacit knowledge conducted by Sternberg and others (e.g., Magnus and Morgan, 1950; Wagner and Sternberg, 1985; Reber, 1993; Sternberg, Forsythe, Horvath, Snook, Wagner, Hedlund, Tremble, Williams, and Grigorenko, 1999; Dunn and Lozinski, 2005, Dunn, Taylor, and Lipsky, 1996; and Bennet and Bennet, 2008). The study parameters and dates differ, but the research methods and findings all touch on the key component of tacit knowledge as knowledge that is acquired through personal experience rather than received from others through direct instruction. Tacit knowledge is very important, and highly successful individuals have acquired tacit knowledge and use it successfully. As far as we know, we cannot teach tacit knowledge directly.

This review of the literature will first focus on definitions of tacit knowledge by noted researchers. Expertise will be discussed next, followed by explanations of how
tacit knowledge has been researched. Finally, the importance of tacit knowledge used in education will be discussed.

2.1 Definitions of Tacit Knowledge

One may view tacit knowledge as the glue that binds explicit (“fully and clearly expressed”) knowledge together. Tacit knowledge is viewed (Polanyi, 1958) as the “know-how” as opposed to the “know-what” – facts, or “know-why” – science. That “know-how” involves making judgments without reflecting on rules or principles. The term tacit knowledge, introduced by Polanyi (1967) has also been used to characterize the knowledge “gained from everyday experience that has an implicit, unarticulated quality.”

Polanyi claimed that we make sense of reality by categorizing it. Furthermore, the patterns of categorization are made up of theories, methods, feelings, values, and skills which can be used to make judgments. We tend to work from particulars to the general task or concept. Polanyi (1967) contended that knowledge that is used as a mechanism to handle or improve what is in focus is tacit knowledge. Tacit knowledge acts as the background knowledge which assists in accomplishing a task which is in focus. This integration is an informal act of the mind and cannot be replaced by a formal operation (1967). This skill of integrating knowledge is personal. According to Polanyi, when we understand something tacitly, we “incorporate it in our body.” Polanyi explained that just as a person cannot simply understand poetry simply by reading about poetic structure, a person cannot employ empirical knowledge to understand reality.

Polanyi’s concept of knowledge is based on three main theses:

First, all true discovery cannot be accounted for by a set of articulated
rules or algorithms. Second, knowledge is public and also to a very great extent personal (i.e., it is constructed by humans and therefore contains emotions, “passion”). Third, the knowledge that underlies the explicit knowledge is more fundamental; all knowledge is either tacit or rooted in tacit knowledge (1967, p. 28).

Therefore, tacit knowledge is not private but social (Polanyi, 1967). Socially conveyed knowledge mixes with experiences of reality of individuals. Individuals gather new experiences that are always assimilated through the concepts that the person has at his/her disposal and which he or she has acquired from other users of the same language. These concepts are tacitly acquired. According to Polanyi, all our knowledge is, therefore, resting in a tacit aspect.

To hold such knowledge is an act deeply committed to the conviction that there is something there to be discovered. It is personal, in the sense of involving the personality of him or her who holds it, and also in the sense of being, as a rule, solitary; but there is no trace of self-indulgence. We can know more than we can tell. The discoverer is filled with a compelling sense of responsibility for the pursuit of a hidden truth, which demands his services for revealing it. His act of knowing exercises a personal judgment in relating evidence to an external reality, an aspect of which he is seeking to apprehend (1967, p. 24-25).

Inspired by Gestalt psychology, Polanyi states the process of knowing as fragmentary clues, which are integrated into categories (Sveiby, 1996). Polanyi (1967)
believed that we may never fully articulate tacit knowledge primarily because it is based on “bodily and communal realities, not conceptual ones”.

Magnus and Morgan (1999) used Polanyi’s term “personal knowledge” which ranges from the cognitive domain of our abilities to assess risks or recognize order, to the kinds of practical expertise involved in manual or bodily skills. They also point out that tacit knowledge enters everyday activities such as riding a bicycle, a skill which can not be easily imitated by a learner or articulated into a set of rules by another individual. Tacit knowledge involves gut feelings, experience, and intuition making it difficult to articulate or express to other people, especially novices (Mitri, 2003).

Research on implicit – tacit - learning has focused on the experience of learning without intention or awareness (Sternberg et al., 1999). Such personal knowledge is grounded in experience that cannot be expressed in its fullest according to Horvath (1999).

Robert Sternberg conducted tacit knowledge research quite extensively on his own and with various colleagues. In research by Wagner and Sternberg (1985), tacit knowledge was defined as knowledge that is usually not openly expressed or taught to an individual. In his own research, Wagner (1987) categorized tacit knowledge on the basis of 1) the content of a situation (whether it involves managing oneself, others, or one’s tasks), 2) the context of a situation (whether it is short range, self-contained or long range in nature), and 3) orientation (whether one’s focus is idealistic or pragmatic).

Tacit knowledge takes on the form of a production process in a series of “if – then” statements that a person asks him/herself in a pre-specified order (Sternberg, 1998). Sternberg (1999) views tacit knowledge as a key to intelligent behavior in practical
settings and as practical know-how that a person needs to succeed in life. Sternberg et al. (1999) state tacit knowledge as an important factor underlying the successful performance of real-world tasks. They further state tacit knowledge as knowledge that reflects the practical ability to learn from experience and to apply that knowledge in pursuit of personally valued goals. Tacit knowledge is acquired while performing everyday activities typically without conscious awareness of what is being learned. Although actions may reflect knowledge, people may have difficulty articulating what they, in fact, know (Kaufman & Grigorenko, 2009).

Tacit knowledge is action-oriented and allows people to achieve goals they value. Sternberg (1998) stated that tacit knowledge has three main components: 1) it is procedural, 2) it is relevant to the attainment of the goals people value, and 3) it typically is acquired with little help from others. Tacit knowledge is connected to particular uses in particular situations or classes of situations. In the research, Sternberg’s work emphasizes viewing condition-action sequences as useful tools for understanding the mental processing of tacit knowledge. Sternberg offers this example of tacit knowledge as sited by Kaufman and Grigorenko:

If one needs to deliver bad news to one’s boss, and it is Monday morning, and the boss’s golf game was rained out the day before, and the boss’s staff seems to be “walking on eggshells,” then it is better to wait until later to deliver the news (2009, p. 358).

The abovementioned scenario involving the employee and his boss is an example of a mental process using tacit knowledge. Tacit knowledge tends to increase with experience, but it is what a person learns from the experience rather than the experience
itself that is important. Most importantly, tacit knowledge is not synonymous with job knowledge. This use of tacit knowledge is a key component of “practical intelligence,” which is the ability to analyze or judge a situation for the purpose of adapting to it (Sternberg, 2009).

St. Germain and Quinn (2005) studied tacit knowledge in principal leadership and stated that tacit knowledge is grounded in experience and stated that definitions have ranged from “practical wisdom” and intuition to “knowledge that is bound up in the activity and effort that produced it.” They also contended that the philosophical framework of tacit knowledge was found in the 1967 work of Polanyi who distinguished tacit knowledge from Gestalt, arguing that tacit knowledge is not the activity of spontaneous perception, but the outcome of the “active shaping of experience performed in the pursuit of knowledge” (St. Germain & Quinn, 2005, p. 81).

Dunn’s work with Lozinski (2005) focuses on tacit knowledge in classroom management. Their research states that tacit knowledge is experienced-based, context-bound, and not directly teachable. Their research is based on the studies conducted by Sternberg and his colleagues and their methodology, to a considerable degree, was replicated in this study.

Bennet and Bennet (2008) define tacit knowledge as the descriptive term for connection among thoughts that often cannot be put into words. This knowledge is knowing what decision to make or how to do something that is difficult to voice to another person so that he or she could re-create that knowledge or understanding. Bennett and Bennett used a functional definition of knowledge as having four aspects of tacit knowledge: embodied, affective, intuitive, and spiritual. This know-how that
researches have named tacit knowledge is what separates experts from novices. Experts, according to St. Germain and Quinn (2005), are able to obtain greater feedback from context which is a characteristic of the nature of tacit knowledge.

According to Dunn, Taylor, Kleshinski, and O’Neil (2009) (under review), tacit knowledge is acquired without direct help from others. This type of knowledge is unspoken, underemphasized, or poorly relayed relative to its importance for practical success. Coincidentally, tacit knowledge is acquired within conditions of little situational support, which refers to people who help an individual acquire knowledge. Experience, alone, is insufficient for the acquisition of tacit knowledge (Dunn, et al, 2009); what a person does with the experiences results in the acquisition of tacit knowledge. This experience is what leads individuals to levels of expertise.

2.2 Expertise

According to Dunn and Lozinski (2005), expert teachers have developed highly organized and accessible knowledge structures for classroom management purposes. It is these highly developed knowledge structures (as opposed to general problem-solving skills) developed over years of teaching experience that account for differences between experts and novices. This kind of expert knowledge is tacit because it is based on experience, is context-bound, and is not teachable (Dunn & Lozinski, 2005).

Tacit knowledge of expertise is often hidden behind intelligent action and acts at a subconscious level (Wagner & Sternberg, 1986). According to Magnus and Morgan (1999), “the master” has the ability to assess a situation and take into consideration many aspects at once using several processes. Research by Patel, Arocha, and Kaufman (1999)
focused on differences between subjects differing in terms of expertise. Among the expert characteristics revealed in their research are the following:

- Experts are capable of perceiving large patterns of meaningful information in their domain that novices cannot perceive.
- They are fast at processing different skills required for problem solving. They have a superior short-term and long-term memory for materials related to their domain of expertise, but not outside their domain. They typically represent problems in their domain at deeper, more principled level, whereas novices show a superficial level of representation. They spend more time assessing the problem prior to solving it, whereas novices tend to spend more time working on the solution itself and little time in problem assessment (Patel, Arocha, & Kaufman, 1999, p. 81).

In a study by Nestor-Baker and Hoy (2001), expert performance is viewed as being dependent on a large accumulation of knowledge, which allows insightful perception of a task. The knowledge base of experts also contains remembered impressions, emotions, and mental pictures, which are part of the knowledge structure and may be used in the decision-making process. Nestor-Baker and Hoy (2001) claim that experience can only contribute to expertise if those people are capable of learning from it. Their research indicates strong connections between the development and application of expertise and tacit knowledge, particularly when the expertise is related to a goal and problem solving. They also state that tacit knowledge is vital to the
development of professional expertise, acting as a pivotal link in the reification (conversion into a concrete thing) of domain knowledge (2001).

In their research on student teachers eliciting practical knowledge from experienced teachers, Meijer, Zanting, and Verloop (2002) report that expert teachers (compared to novices) are

considered to have a larger knowledge base from which to draw, their knowledge base is organized more efficiently in complex interconnected schemata, and is utilized more effectively (p. 407).

In addition, St. Germain and Quinn (2005) state that those who can be considered expert performers have larger amounts of if-then situations to draw from allowing them instinctive, or tacit, direction to the tasks at hand. Further studies include superior timing as a component of the progressive problem solving of experts (St. Germain & Quinn, 2005). If facing increasingly difficult challenges leads to expertise, perhaps experts with a wealth of tacit knowledge actually might thrive and grow from informal, continuous exchanges in which knowledge is created “on the spot” (St. Germain & Quinn, 2005). The ability to deal skillfully with and create variety in judgments distinguishes the expert from the novice. Individuals may be considered experts if they reveal the following characteristics, according to St. Germain and Quinn:

the possession of complex knowledge and skills; reliable application in actions intended to accomplish generally endorsed goals; a record of goal accomplishment, as a consequence of those actions, which meets standards appropriate to the occupation or field of practice, as judged by clients and
other experts in the field (2005, p. 85).

St. Germain and Quinn contend that experts (leaders) are those who possess broad tacit knowledge and are able to abstain from making decisions too early or too late. Their research also characterizes experts as having a calm assurance that is brought to problem solving and the ability to handle problems more assertively and quickly than novices. St. Germain and Quinn (2005) explain that experts acquire greater analytical and sequential skills for problem analysis and respond to situations with rational judgment. Their research reveals that expert school principals have developed a repertoire of responses to unanticipated obstacles and resolve them with ease. Likewise, expert principals use tacit knowledge to build relationships by gaining trust and support with staff and have the ability to identify and articulate their vision while developing group goals more so than novice principals (St. Germain & Quinn, 2005).

To have a basic comprehension of tacit knowledge, we must understand that the acquisition and use of this knowledge seems to be uniquely important to competent and expert performance in real-world activities. For that reason, it is important to investigate how tacit knowledge has been researched and in what domains.

2.3 How Tacit Knowledge has been Researched

Knowing the definition of tacit knowledge and comprehending how such knowledge lends itself to the performance of experts is valuable in order for a person to understand the ways in which tacit knowledge has been researched in various fields. Investigations of tacit knowledge have been carried out in such arenas as science, business, military, law, medicine, and education.
The role of tacit or personal knowledge in practical methodology of science was first introduced by Michael Polanyi in 1958 and 1967. Collins (2001) carried out empirical studies into tacit knowledge in the sciences. He suggested that in order to understand science, students must not only learn scientific theories and procedures, but they must also acquire tacit knowledge by working alongside an experienced professional.

Wagner and Sternberg (1985) conducted three separate experiments to examine the role of tacit knowledge in practical intelligent behavior. They looked at tacit knowledge involved in managing oneself, others, and one’s career. Tacit knowledge was looked at in terms of performance. They interviewed experienced and highly successful individuals in the real-world pursuits of interests. Three experiments were carried out beginning with interviews with psychologists from Yale. On the basis of the interviews, theoretical framework, and review of past literature, a set of work-related situations were designed to sample tacit knowledge about managing self, others, and career. A second experiment was an attempt to replicate and generalize findings from the first experiment in a second career pursuit – business management. The third experiment was an attempt to cross-validate the findings of the second experiment by replicating it with a sample of bank managers. Most of the professionals involved in the studies reported that much, if not most, of the learning that matters to their careers occurred after completion of any formal training. Interestingly, overall tacit knowledge was unrelated to either academic rank or year degree was obtained (Wagner & Sternberg, 1985).

These results demonstrate that tacit knowledge is consequential for certain research-related aspects of career performance, but also
that tacit knowledge is not automatically acquired with years of experience (Wagner & Sternberg, 1985, p. 445).

Research conducted by Sternberg, Wagner, Williams, and Horvath (1995), shows that tacit knowledge can be measured. The measurement instruments used consisted of work-related situations in business, each with between five and twenty response items. Each situation poses a situation for the participant to solve, and the participant indicates how she or he would best solve the problem by rating the response items. Tacit knowledge measurement instruments developed by Williams and Sternberg contain statements describing actions taken in the workplace, which employees rate for how characteristic the actions are of their behavior (Sternberg, et al, 1995). Also, open-ended problem situations are described, and participants are asked to write plans of action that show how they would handle the situations. One further procedure for gathering research was in a study of tacit knowledge whereby “rules of thumb” were collected through reading and interviews. Sternberg et al (1995) noted that response items were constructed so that some items represented correct applications of the “rules of thumb” (a useful principle with wide application, not intended to be strictly accurate) while other items represented incorrect or distorted application of the “rules.” Response items were constructed so that some items represented correct application of the rules of thumb while other items represented incorrect or distorted application of the rules of thumb. The tacit knowledge was scored for the degree to which participants preferred response items that represented correct applications of the rules of thumb.

Sternberg and his colleagues (1995) administered this tacit knowledge inventory to three groups in the area of business management ranging from managers, business
school graduate students, and Yale undergraduates. The business managers, whose average age was 50, outperformed the business graduate students and the undergraduates; the graduate students also outperformed the undergraduates indicating that the experiential (tacit) knowledge of the expert managers led to their increased performance.

Wagner, one of Sternberg’s colleagues, also used a similar format for scoring use of tacit knowledge among academic psychologists (1987). The tacit knowledge measure for academic psychology consisted of 12 work-related situations, each of which was associated with from nine to eleven response items. Of the 12 work-related situations, four were constructed to sample each of the three contents of tacit knowledge (managing self, tasks, and others). Subjects were given a work-related situation and then rated each response alternative on a 7-point scale by either its quality (extremely bad – extremely good) or its importance (extremely unimportant – extremely important), depending on the response item. Results were gathered from a study with psychology professors, psychology graduate students, and undergraduates through a nomination process. There were expert-novice differences in tacit knowledge. If the tacit knowledge instrument that was used revealed the tacit knowledge acquired as a result of formal training and experience, there should be an increasing trend in average scores across groups with increasing levels of professional development. The results of these studies suggest that the development of tacit knowledge resembles the development of everyday problem solving more than that of cognitive ability.

Sternberg’s 1998 article takes on a personal tone as it relates to tacit knowledge about interacting with oneself, with others, or about interacting with tasks. He posits that tacit knowledge about oneself is usually informal self-understanding about a person’s
role in society. Tacit knowledge about others refers to understanding about other people and the role they take on in one’s life. Tacit knowledge about tasks involves how a person structures time and resources to accomplish tasks. Sternberg’s (1998) studies further encompass areas of cultural differences and indicate that intelligence in most of the world is associated with careful thought, sorting of options, and deliberate reflection on possible solutions. Cultural differences often have a hidden meaning as to what it means to be competent. Most of this knowledge is tacit because it is not usually taught or verbalized. The role of tacit knowledge in human abilities, according to Sternberg (1998), is the acquisition and utilization of tacit knowledge used to adapt, shape, and select environments and tacit knowledge is an important part of all three of these functions of human behavior. Many immigrants have difficulty learning tacit knowledge about the culture to which they emigrate. For them, three processes are key to the learning of tacit knowledge in order to socialize in the new environment (Sternberg, Wagner, & Okagaki, 1993). These processes are referred to as selective encoding, selective combination, and selective comparison.

Selective encoding is involved in distinguishing relevant from irrelevant information in a stream of information. Selective combination, the second learning process, involves combining the pieces of information in a large stream of information to make sense of them. Selective comparison, the third learning process, involves drawing on past information in order to understand present information adequately. By relating new information to old, new information can be put in a context
that makes sense of it (Sternberg, 1998, p. 711).

Sternberg and his colleagues present these three processes as indicating degrees of how much help one gets from others in learning situations in general and not just in enculturation issues.

One does not have to travel out of the United States to find examples of cultural differences; some exist among subcultural groups in the U.S. In a series of studies (Gardner, Krechevsky, Sternberg, & Okagaki, 1994; Sternberg, Okagaki & Jackson, 1990), a program was developed to teach tacit knowledge to middle school students using a pretest-posttest design with experimental and control (untreated) groups. The program is considered useful for all students, but is especially useful for immigrant children who are unfamiliar with tacit knowledge about school expectations. The program consists of problem-solving approaches such as experiential learning and simulations to help students learn about school in such areas as homework, test-taking, reading, and writing. The program resulted in significantly greater gains in achievement and work habits from pretest to posttest for students who were in the program than for controls. In other words, tacit knowledge can be taught – children who do not know the tacit expectations of the school can learn them if only they are made explicit (Sternberg, 1998).

Thesis research by Carr (1988) examined the role tacit knowledge plays in mentoring in the performance of 155 employed graduate and undergraduate business students who were asked to rate peers and superiors at work by completing a questionnaire. Her research also involved the subjects completing a business tacit knowledge “test” like the one developed by Sternberg and his colleagues (1995) about their peers and superiors which was developed by Wagner and Sternberg. The proposal
was that those who rated peers and/or superiors higher on mentoring behaviors would themselves be higher in their use of tacit knowledge. Those hypotheses were supported (Carr, 1988). Wagner and Sternberg’s earlier findings that tacit knowledge was related to various experience variables and unrelated to various academic variables were also replicated in the study.

A large-scale study was conducted by Sternberg, et al (1999), focusing on tacit knowledge in the workplace predominately for military leadership of platoon leaders, company commanders, and battalion commanders. This was a six-year project to capture and illustrate leadership tacit knowledge among Army commanders at the various levels. Their research first looked at the cognitive operations of tacit knowledge, followed by measurements of tacit knowledge in their work situations, then led to measurements in Army leadership.

Military personnel officers were asked to recall specific examples of informal knowledge that they acquired on the job. By asking for situational stories, Horvath, Forsythe, Bullis, Sweeney, Williams, McNally, Wattendorf, and Sternberg (1999) were able to get their subjects to talk about concrete experiences instead of abstract leadership concepts. Their findings with military personnel are similar to those with other professionals included in Sternberg (1999) and suggest that tacit knowledge varies by organizational level.

In general, the tacit knowledge content for a particular level reflects salient developmental challenges that leaders face when they approach that level (Horvath, et al, 1999, p. 48).
The functions of tacit knowledge appeared to exemplify leadership by making it more applicable and fill in gaps by providing knowledge through direct experience (Horvath, et al, 1999).

The research makes a case of leadership versus management by academics and practitioners and contends that leaders tend to be visionaries who inspire workers while managers have a narrow perspective that is concerned with mastering routines (Sternberg, et al, 1999). A book entitled *Practical Intelligence in Everyday Life* published in 2000 gives the details and results of the study to a wide range of interested groups.

Sternberg and his colleagues were not the only people conducting research of tacit knowledge in the professional arena. Other researchers focused on tacit knowledge in a variety of professions including business, law, medicine, and education. They also sought to separate knowledge about leadership from other features of expertise in order to find the knowledge that is relevant to professional performance but is most likely attributed to the unique traits of the leader. This knowledge, they surmised, would link the tacit knowledge framework in one profession to performance in other professional domains.

Sanchez (1998), in his research with business, states that the dissemination of tacit knowledge in an organization is best accomplished by the transfer of people as “knowledge carriers” from one part of a business organization to another. Most likely, managers of organizations are unaware of what specific kinds of knowledge the individuals in their organizations possess. This was common to executives Hewlett-Packard in the 1980s when they were noted as saying:

If we only knew what we know, we could conquer the
world (Sanchez, 1998, p. 4).

In an effort to find out who knows what, Philips, the electronics company, created a “yellow pages” listing experts with different kinds of knowledge within its many business units (Sanchez, 1998).

In the field of medicine, Patel, Arocha, and Kaufman (1999) found that expert clinicians have cases stored in long-term memory that can be applied in their practice to generate accurate diagnoses with considerable efficiency. This also indicates that diagnostic efficiency and reasoning are determined by knowledge that is specific to the physician’s tacit knowledge of the case situation, not due to the possession of explicit knowledge. Patel et al (1999) compared clinical practitioners to medical researchers in solving the same two clinical problems. The experts’ experience differed in terms of the context of their practice. Practitioners showed little tendency to use basic science in explaining the cases, whereas medical researchers showed preference for detailed, basic-scientific explanations without developing clinical descriptions.

The medical researchers engaged in considerable causal reasoning but did not successfully resolve the problem (Patel, et al, 1999).

Similarly, a lawyer must use the lessons of experience, knowledge from mentors, and observations made of the legal system in order to be considered competent (Marchant & Robinson, 1999). Like most other professions, law relies on the nature of experience to guide novice members of the profession in the development of their expertise and competence.

The tacit knowledge of a lawyer is structured around the identification of key facts and the search for appropriate precedent using search
mechanisms based on similarity, consistency, and pragmatic considerations (Marchant & Robinson, 1999, p. 18).

Two different strategies may be used to teach law: by cases and by rules. Marchant and Robinson (1999) examined the impact of these two strategies as well as an examples strategy and the examples strategy outperformed the rules strategy. When an instructional case was used to illustrate a principle, the case strategy was superior. Lawyers have also responded that they learned more from sitting at the back of a courtroom than they learned in a semester of law school. In the past, legal apprenticeships formalized mentoring and the performance of the mentor was directly measured by the success of the apprentice. After all, students learn by practice developing their tacit knowledge in a somewhat purposeful fashion (Marchant & Robinson, 1999).

Because tacit knowledge is connected to the senses, personal experience, and body language, the transfer of such knowledge requires close physical proximity while work is being done (Von Krogh, Ichijo, & Nonaka, 2000). Face-to-face interaction is crucial in order to capture a full range of sensations and reactions that are necessary for transferring tacit knowledge. For the most part, people describe what they know through words, but interactions also include body language which is all part of the acquisition of tacit knowledge. Even acquiring advice from experienced advisors provides students with training which is quite different from book learning (Magnus & Morgan, 1999). Conversations also allow people to share mental models and skills, which would reinforce the transfer of tacit knowledge (Von Krogh, et al, 2000).
Nestor-Baker and Hoy (2001) state that most of the studies of tacit knowledge have been in the fields of military, sales, business, law, and medicine, but they contend that the investigation of tacit knowledge of educational administrators has been ignored despite the fact that experience and practical intelligence have long been critical for effective school administrators. The purpose of their study was to

a) begin to map the domain of tacit knowledge of superintendents

b) identify the quantity and content of tacit knowledge of a group of Ohio superintendents

c) compare the tacit knowledge of reputationally successful superintendents and typical superintendents (Nestor-Baker & Hoy, 2001, p. 87).

At ten-year intervals, the American Association of School Administrators (AASA) sponsors a study of the superintendency. The criteria include such factors as Board/Superintendent Relations, Management Functions, Community Relations, Budget Development, and Leadership/Knowledge. They represent implicit beliefs about the role of the superintendent. Although boards of education have superintendent evaluation policies and are encouraged by their state and national associations to evaluate against stated criteria, the AASA studies strongly suggested that the evaluative criteria tend to be based on tacit knowledge of both the board and superintendent (Nestor-Baker & Hoy, 2001). Evaluation of success in the superintendency is predicated on how well the superintendent has understood and acted on the tacit expectations. This work is in agreement with Patel et al (1999) “probably nowhere is the study of implicit – tacit –
knowledge more important than in the professions, where a large part of learning occurs in practice, after formal training has been completed” (p. 77).

St. Germain and Quinn (2005) studied on-the-job knowledge used by novice and expert principals and how that knowledge differed. The participant selection consisted of two precautions due to time constraints. Only those principals who had at least five years of principal experience were considered for the expert groups. Second, principals were considered to be experts in they showed evidence of:

- the possession of complex knowledge and skills;
- reliable application in actions intended to accomplish generally endorsed goals; and a record of goal accomplishment, as a consequence of those actions, which meets standards appropriate to the occupation or field of practice, as judged by clients and other experts in the field (St. Germain & Quinn, 2005, p. 82).

In their study, themes were collated and arranged so that descriptions could be assessed for each principal to view any meanings behind the experiences. They found that most errors made by novice administrators involved reaching decisions or closure too soon during the problem-solving process. Also, both novice and expert administrators drew upon previous experiences, but experts were able to obtain greater feedback from the context of a situation which is a characteristic of the nature of tacit knowledge (Von Krogh, Ichijo, & Nonaka, 2000). Some other results that were noted include

When discontent among staff members escalated, novice
principals grew confused because their plan of action did not follow its predetermined course. For these principals, the timing of responses to obstacles was critical (St. Germain & Quinn, 2005, p. 9).

Linked to the importance of tacit knowledge in school principals is tacit knowledge used by teachers in classroom management. Dunn and Lozinski (2005) conducted a study based on Sternberg’s principles and research to learn more about the tacit knowledge that teachers use in classroom management. The study was limited to experienced teachers with a minimum of eight years’ experience. Thirty four teachers from fourth through eighth grade were interviewed by responding to questions which asked for specific personal experiences related to successful and unsuccessful classroom management and about how they learned to be effective classroom managers. An overall classification scheme was developed for teacher responses and each of the five questions was analyzed. This study was similar to Sternberg’s work in its search for the three major characteristics of tacit knowledge.

Dunn and colleagues also investigated tacit knowledge in the profession of medicine. Their procedure involved capturing an instance of a physician working with a patient on videotape. Later, in a simulated recall procedure, the physician would comment on his or her performance while viewing the videotape (Dunn, Taylor, & Lipsky, 1996). They looked for instances of tacit knowledge and then used variations of a learning hierarchy analysis to infer what previously acquired knowledge was likely supporting the actions.
All major organizations are dealing with a revolution in their knowledge models (Bhardwaj & Monin, 2006). There is a need to research tacit knowledge because it is the source of motivation for human actions in all workplaces. A study by Bhardwaj and Monin (2006) attempted to gain insight into the multidimensional interplay in important subsystems using the storytelling method. They make the claim that tacit knowledge is embedded in narratives and finds effective articulation in the situational work-related stories that circulate within organizations. They state that deconstructing stories can give insight into the embedded tacit knowledge in them.

Tacit knowledge is like an iceberg with only 10 percent of it being above water and the 90 percent hidden (2006, p. 73).

These two authors make the claim that tacit knowledge interacts with subsystems such as psychological, intellectual, functional, social, and cultural of many organizations and shapes their knowledge base. Interestingly though, the tacit knowledge of an individual is relevant only when it can be utilized for the benefit of the organization. Because of this, tacit knowledge becomes collective only when it is re-described through creative dialogue and practice.

Perhaps it is what we learn from experience rather than experience itself that matters in the pursuit of tacit knowledge in many, if not all, professions. The main focus of effective knowledge management is a positive reception of the skills and processes involved in the application, communication, development, and retention of tacit knowledge in professional settings (McAdam, Mason, & McCrory, 2007). An organization’s main competency is more than “know-what” knowledge. Tacit “know-
how” is that which separates the experts from the novices (McAdam, et al, 2007).

Opportunities to use tacit knowledge are paramount in attracting and maintaining talented employees.

Interestingly enough, research in tacit knowledge is extending to scholars from many disciplines including economics, social sciences, philosophy, cognitive sciences, neurosciences and is the first step in developing more detailed categorization of the differing forms of tacit knowledge (Pozzali, 2007). Researchers are still far from developing clear definitions and categories of tacit knowledge, however. Most literature has dealt with tacit knowledge as a product rather than as a process. Pozzali (2007) contends that the concept of tacit knowledge has been developed in philosophy and sociology of science in order to incorporate it within a more comprehensive theory of practices and their role in social reality. This goes back to Polanyi’s (1958) “we know more than we can say.”

Further discussion of tacit knowledge in the educational domain will be discussed separately in order to give the topic consideration separate from other professions.

2.4 The Importance of Tacit Knowledge in Education

Knowing something usually means being able to function within whatever domain of effective performance that something is represented (Reber, 1993, p. 22).

Some students are not particularly good standard students and often bristle at directed study classes and assigned reading and writing papers. They often find that what
is the most satisfactory learning is what takes place through “osmosis” or simply being immersed in the material and allowing understanding to come about almost magically over time. The knowledge that results is not often easily articulated and the process itself seems to occur in the absence of any efforts to learn what was learned (Reber, 1993). This problem of tacit knowledge, its acquisition, and epistemic status has been the focus of considerable research.

2.4.1 Tacit Knowledge and school performance

Studies by Sternberg, Wagner, Williams, and Horvath (1995) included the role of tacit knowledge in school performance and led to the publication of Practical Intelligence for Schools Project (2002) which involved six years of intensive observations and interviews of students and teachers to determine the degree of tacit knowledge necessary for success in school and was used to monitor how tacit knowledge was developed in matched-group controlled programs in Connecticut (Williams, Blythe, White, Li, Sternberg, & Gardner, 2002). The research indicated that tacit knowledge is instrumental to school success, but further research adds more to the question of how we measure success. The results of the Practical Intelligence for Schools Project curriculum are being used in hundreds of classrooms across the United States. The Connecticut area students involved in the project showed significantly greater increases in reading, writing, homework, and test-taking ability over the school year compared with students in the same schools not involved in the project’s curriculum (Williams, et al, 2002).
2.4.2 Tacit Knowledge and test-taking

Sternberg’s 1998 study of education for immigrants makes the claim that tacit knowledge in or outside of school is different in varying cultures. In the United States, students are expected to learn subject material and memorize basic facts, but they are not held accountable for memorizing text word for word in order to repeat that same information in a test situation. Most students in the U.S. are expected to understand basic ideas of what they have learned and be able to recall and use that knowledge on standardized tests. Children with little experience taking standardized tests are not likely to have tacit knowledge about test-taking (and/or standardized tests themselves) and are likely to perform poorly on those tests (Sternberg, 1998). Tacit knowledge involved in taking most standardized tests is acquired from the experience of taking such tests and not from being taught “how” to take the test. Students in many other countries learn mostly by rote memorization possibly to the extent of learning information word for word. Those students are unprepared for the type of education – application of material – that takes place in the U.S. when they move here. Sternberg (1998, p. 707) contends that a problem arises for these students and/or their parents when

- a) the cultures come into contact with each other
- b) the host culture expects immigrants to have tacit knowledge they do not, and realistically, could not have
- c) the host culture then deprives immigrants of good will or benefits because of their lack of tacit knowledge.
By most measures, Canada is much more similar in its tacit knowledge of test-taking and standardized tests to the United States than Mexico even though both countries border the United States (Sternberg, 1998).

Sternberg’s findings reveal that tacit knowledge related to test-taking tends to increase with experience, but it also depends on how the student benefited from the experience and not just the experience that determines how much tacit knowledge is acquired by that individual. Also, tacit knowledge levels predict performance in school as well as or better than conventional ability tests (Sternberg, 1998). Therefore, tacit knowledge, an important component in school success, is involved in helping an individual adapt to environments and also helps shape those individuals and environments. Sternberg (1998) contends that tacit knowledge is not just a collection of pieces of information; there is a structure that makes this knowledge somewhat difficult to learn and to teach. In order to help an individual develop tacit knowledge, learning experiences should be provided rather than direct instruction about what to do and when to do it.

2.4.3 Intuition and tacit knowledge

In each of the experiences in the educational arena, there are many ways to conceptualize tacit knowledge. A student interested in becoming a teacher has her own ideas about education, ideas that might be called intuitive conceptions. These intuitive conceptions of education often take the form of tacit knowledge (Torff, 1999). There are many ways to conceptualize the tacit knowledge of education for those who will teach future generations of students and teachers. There is an intermingling of intuitive/tacit
concepts about education with concepts and theories taught in college courses in teacher education. The alternation between the intuitive and the formal depends on tacit affirmations, both at the beginning and at the end of each chain of formal reasoning (Polany, 1958). Future teachers’ prior expectations, beliefs, and knowledge influence what they will value, understand, and utilize from college courses.

There are two ways new teachers gain knowledge; one is a tacit and intuitive knowledge with which students begin, and the other is a disciplinary one provided by college curriculum. Little has been written about how or why prospective teachers grasp intuitive conceptions about teaching and learning (Torff, 1999). Torff contends that a speculative account of the origins and development of these preconceptions may yield insight into the tacit knowledge involved in education. Further research lends itself to tacit knowledge in the relationship between student teachers and mentors.

2.4.4 Student teachers and mentors

Sitting at the back of the room observing how experienced teachers behave does not automatically help student teachers develop a deeper understanding of teaching. Copying the behavior of experienced teachers will most likely result in imitation while lacking personal initiative on the part of the novice (Meijer, Zanting, & Verloop, 2002).

Student teachers may experience difficulties relating theories taught in college courses to what actually takes place in their teaching practice. Often the method or teaching style employed by their mentor teacher is notably different than those theories, and the knowledge their mentors have is better suited to everyday teaching practice. These mentors – experienced teachers – have developed a practical – tacit – knowledge
that underlies their teaching. Student teachers are interested in learning rules of thumb and tips for their own lessons, but they often do not view the mentor as an articulator for practical knowledge (Meijer, et al, 2002). The object of the research study by Meijer, Zanting, and Verloop was to find ways to involve teachers’ practical knowledge in the education of student teachers (2002). Student teachers’ study of their mentor teachers’ tacit knowledge can result in:

a) a deeper insight into the cognitive aspect of teaching,

b) an understanding of the complexity of teachers’ practical knowledge and how this is related to teaching practice, and
c) encouragement of student teachers to reflect on and elaborate their own developing practical knowledge (Meijer, et al, 2002, p. 407).

In their study, Meijer et al used two instruments – stimulated recall interview and concept mapping - to find ways to elicit and describe experienced teachers’ practical knowledge. In the stimulated recall interview, teachers explained what they were thinking in response to a videotape of a lesson they had just presented. In creating a concept map, teachers identified concepts they viewed as important to a central concept and then organized them into the concept map (2002). These instruments are interesting for involving the practical knowledge of experienced teachers in teacher education as they can be tools to

a) structure sessions between a student teacher and her or his mentor teacher, b) allow student teachers to analyze the practical knowledge of an experienced teacher, and
c) stimulate student teachers to explicate and reflect on

Literature has described the contents of teachers’ tacit knowledge and those
contents are often reflected in descriptions of subject-related practical knowledge.
Research has identified the traits of teachers’ tacit knowledge and defined it as personal,
situated, based on reflection of experience, mainly tacit, and content-related (Meijer, et
al, 2002).

Literature reviews have shown why detailed descriptions of the contents of
teachers’ practical knowledge are relevant for student teachers. Researchers and mentors
have suggested ways of implementing such descriptions as cases, narratives, or stories in
teacher education courses. It is important for student teachers to elicit, examine, and
work with mentors’ practical knowledge as well as learn from theories about subject
matter and child psychology, learning through reflection or learning through practical

2.4.5 Implementation of Tacit Knowledge

Learning is constantly taking place as individuals adapt to environments on a
daily basis. Research conducted by D’Eredita and Barreto (2006) illustrated others’
research that knowledge is converted in a process of sharing and reflection composed of
internalization (conversion of explicit-to-tacit knowledge),
socialization (conversion of tacit-to-tacit knowledge),
externalization (conversion of tacit-to-explicit knowledge),
and combination (conversion of explicit-to-explicit knowledge)
Individuals are cued by or to specific stimuli that are often interpreted and personalized for their use. This individual use of knowledge is tacit in nature and is acquired only through countless experiences. This same knowledge is also practical since it relates to context-specific skills. D’Eredita and Barreto (2006) further contend that tacit knowledge is episodic in nature and that processing such episodes consists of a goal a person is attempting to attain. The meaning and interpretation of each episode is personal in nature and is therefore singled out from other experiences. Their findings also propose that tacit knowledge has both cognitive and technical elements.

The cognitive elements center on mental models in which human beings form working models of the world. These working models include schemata, paradigms, beliefs, and viewpoints that provide perspectives. By contrast, the technical element of tacit knowledge covers concrete know-how, crafts, and skills that apply to specific contexts (D’Eredita & Barreto, 2006, p. 1825).

The research by D’Eredita and Barreto (2006) validates propositions that tacit knowledge may be context-specific considering that research deals with similar behaviors by exploring the reasons behind elevated levels of human performance that are presumably anchored by the tacit knowledge of individuals. The findings appear to be beyond coincidence. These researchers also contend that tacit knowledge is acquired through experience and that experience results from the construction of and relationship between episodes.
D’Eredita and Barreto (2006) explained that when a person is introduced to a tool, he or she first wants to use that tool. One must draw on prior experience – tacit knowledge – about any experience in a similar episode before actually using the tool properly. Another example is a driver learning to drive a stick-shift car who determines the workings of the clutch and gas pedal. As the person gains experience with these, he or she then must attain a further goal of accelerating the car by first calling forth prior knowledge. The teacher of this driver must also call forth prior tacit knowledge in order to best educate the new driver. All of these episodes or experiences are being transferred from one person to another for the purpose of optimally driving a stick-shift car using tacit knowledge as a guide (D’Eredita & Barreto, 2006). Each of the past experiences helps in the construction of new episodes, or experiences, as they work to direct attention, help in the interpretation of stimuli, and help in the choice of response, given the perceived goal. When the student learns to drive the car, that learning allows for the proliferation of tacit knowledge. Countless experiences are required for any individual seeking tacit knowledge and that experience is the construction of and relations between episodes, or experiences.

2.4.6 Summary of Literature Review

Though not a new term, tacit knowledge is perhaps not as widely used as one may think considering the proliferation of research related to the topic. Dating back to 1958, when Polanyi first coined the term for research purposes, people have been striving to become educated, self-assured individuals with tacit knowledge in all walks of life. Tacit knowledge is the knowledge that guides our behavior and assists people in attaining
goals. People have been attempting that sense of know-how in their lives as it pertains to their career (military, business, law, medicine, etc.) and life.

In the educational domain, students strive to make sense out of countless classroom experiences while attempting to achieve conceptual knowledge of required course material. In addition, they must utilize intuitive – tacit – knowledge to gain understanding of the school atmosphere and learning community in order to perform well on day-to-day school work and standardized tests. Research tells us that the tacit knowledge focus is coincidental, that students acquire this knowledge without purposeful awareness. Students acquire the necessary tacit knowledge through experience in the classroom, with peers, and with situations.

Similarly, educators must also make sense out of their school experiences on a daily basis. Teachers are greeted with students from all walks of life, varied socio-economic backgrounds, ethnicities, and religions, but must aim to teach basically one curriculum to all. Such is the task of the secondary education teacher. The tacit knowledge acquired over the years through experience is further put to the test when applying tried and true strategies with new students. Seasoned, experienced teachers have the benefit of prior knowledge acquired from prior experiences in a variety of situations. That sharing of tacit knowledge with novice teachers through mentoring is what is necessary in order to establish and maintain classroom management styles that work in varying situations with various students.
Chapter 3

Methodology

3.1 Subjects

The purpose of this study was to learn more about the tacit knowledge used by secondary school teachers in classroom management. Experienced teachers are more likely to have developed this tacit knowledge. Therefore, only experienced teachers were recruited. Twenty nine experienced high school classroom teachers (11 from grade 9, 13 from grade 10, and 5 from grade 11) participated in this study. Ten participants were male and nineteen were female and their experience ranged from 8 – 28 years (mean = 15). All teachers were from Northwest Ohio high schools in various local school districts.

3.2 Procedure

Teachers were contacted by email and/or by phone to set up a meeting time and date. During the interview, participants were asked the following questions:

1. Tell me about a situation regarding classroom management or classroom discipline that you feel you handled very well.
2. How did you learn to do that? Did anyone help you?
3. How could you help novice teachers learn to do that?
4. Tell me about a situation regarding classroom management or classroom discipline that you did not handle too well.
5. How could you help novice teachers learn about such situations?

The interviewer wrote down the responses during the interview. The interviewer was free to ask for clarification or encourage the teacher to provide the correct type of response. Consistent with the methodology used by Dunn and Lozinski (2005), responses to question #1 were considered to be most important. A specific instance was asked for as opposed to a general strategy. A general strategy would likely be explicit in nature (e.g., “I have found the Discipline with Dignity model to work well in my class.”); while a specific instance would more likely include tacit knowledge since it involves teacher action in a specific context. If a teacher responded to #1 with a general strategy, the interviewer asked, “Can you describe a specific instance when you think that strategy worked very well?” If the teacher responded again with the general strategy, as opposed to an actual instance, the interviewer proceeded with the subsequent questions.

Questions #2 and 3 called for elaborations of a teacher’s response to #1. While not believed to be a primary source of tacit knowledge, it was thought that Question #4 would yield responses that would provide additional insight regarding how teachers learned to be effective at classroom management. Question #5 was then an elaboration and further discussion of #4. The interviewer was free to ask for clarification and follow a line of inquiry that might help elicit more information regarding the nature of the knowledge used during the classroom management instance under discussion.

3.3 Analysis

After an interview, the interviewer created word files for each teacher. No teacher names, student names, or school names were used in creating these files. A
coding system was used to keep track of teacher and student information (i.e., grade level, subject area, gender, years of teacher experience).

The most complex analysis procedure was carried out for responses to question #1. Below are the guidelines that were followed in analyzing responses to question #1. They are similar to the guidelines used by Dunn and Lozinski (2005):

a) Is the teacher’s scenario a general strategy or is it a specific instance?

If it is a general strategy, it will not be feasible to say much about the “satisfying conditions” component of any procedures that are identified because there was not a specific situation/context described to which the teacher responded.

b) If the teacher’s statement is a specific instance, identify at least one procedure.

Procedures have two components, satisfying conditions, or the “if” component; and an action, or the “then” component.

c) Specify the action component first. This is usually what the teacher did.

There can be more than one action. If so, there will be more than one procedure. For example, a teacher might describe whispering a brief warning in a student’s ear and also meeting one on one with that student after class. Different conditions would need to be satisfied for each action.

d) Infer what you can about what conditions were satisfied before the action or actions were executed. If these conditions are explicit, then this would not be an instance of tacit knowledge. For example, if the satisfying conditions component is “if the student ignores my warning a second time,” and the action component is “then proceed to the third stage of the behavior management plan,” this would not be an instance of tacit knowledge since “ignoring a warning a second time” is quite explicit.
There are many factors that teachers considered in the satisfying conditions component. Also, if the example is tacit knowledge, these factors will not typically be considered in a deliberate process but more likely quite automatically (as in pattern recognition). The teacher is responding to a context, and this context could include several of the following factors:

- the specific student or students involved in the scenario
- the severity of the behavior
- the time and place of the scenario
- the teacher’s prior history with the student or students
- the teacher’s self-assessment of her/his ability to deal with the present situation and to carry out any potential solutions (self-efficacy).

e) After making inferences about what factors might have been involved in the teacher’s “satisfying conditions” processing, then try to state this as a capability. That is, does this procedure (condition – action sequence) represent an instance from a class of condition – action sequences? Can we describe it as such? In doing so, we would be stating it as a capability. These capability statements are similar to Gagne’s intellectual skill capability statements that include both a “class” of stimulus situations (as opposed to one instance), and a “class” of performances (1985, p. 135). The capability statements help us infer what underlying knowledge, tacit in nature, most likely supports the actions taken in the scenario.

The researcher and a professor of Educational Psychology independently reviewed all responses to question #1 for the purpose of identifying instances of tacit
knowledge. They met on numerous occasions to discuss the interview process, the types of responses, and came to a consensus regarding instances of tacit knowledge.

Analyses of Questions #2, 3, and 5 were relatively straightforward in that the researcher looked for major themes that might occur across teachers. For Question #4, the researcher classified responses (i.e., examples of unsuccessful classroom management) as either acts of commission or omission.

The researcher was also able to discuss responses with interviewees as a means of following up on any concerns or questions as they related to the data collection and use thereof.
Chapter 4

Results

The major emphasis is the analysis of teacher responses to Question #1, “Tell me about a situation regarding classroom management or classroom discipline that you feel you handled well.” An overall classification scheme similar to that used by Dunn and Lozinski (2005) was used here to characterize teacher responses to question #1 (see Table 1). There are five categories for Student Behavior, and five categories for Teacher Action. For Student Behavior, SC meant conflict among students; BA meant bad attitude toward teacher or class; SE meant involvement of a special education student; AS meant an academic situation; VO meant a verbal outburst. It was possible that a teacher response to Question #1 could involve more than one category.

Interview #5 involved a male student in an American History class. On a day when the teacher was absent (there was a substitute), one particular male sophomore chose to be a disturbance for the entire period. After reading the substitute’s notes the next morning, the teacher chose to wait until that class met later to address the issue. The male teacher asked the student to remain after class and waited for the other students to vacate the room. He told the student what the substitute reported and expressed to him how disappointed he was in the student’s behavior. The teacher asked if he had done something over the last week to cause the student to decide to act that way. Since the student’s behavior in the past had never been like that, the teacher was rather sure they had a mutual respect. The teacher thought that taking the blame himself would result in
the student not only admitting to the behavior but also realizing that his actions
could reflect on, or be interpreted in, different ways. The student insisted that he liked
the class and the teacher and that had nothing to do with his behaviors the previous day.
He agreed to write an apology note to the substitute. The teacher felt that was not only a
positive management incident but the opportunity to help the young man build some
chacter, also. This scenario was labeled \( BA \) because the student displayed a bad
(disrespectful) attitude toward the substitute teacher.

Regarding categorizing teacher actions: \( EC \) meant that the teacher action
involved effective communication with the student; \( GS \) meant that the teacher action
used was a general strategy; \( GC \) meant that the teacher discussed an individual student
problem with the entire (group) class for further discussion; \( UC \) meant that the teacher
action was uncommon or opposite of what might have been expected; \( CA \) meant that the
teacher action was commonly acceptable. In the scenario above, the American History
teacher’s were categorized as \( EC \) for effective communication with the student. The
category designations for each of the 29 interviews are depicted on Table 1.

At the bottom of Table 1 are the Category totals. The most common Student
Behavior category was bad attitude (\( BA = 19 \)), and the least common category was
conflict among students (\( SC = 2 \)). For Teacher Action the most common category was
effective communication (\( EC = 19 \)), while the least common category was group
conversation (\( GC = 1 \)).

Teachers were asked to respond with a specific instance, as opposed to a general
strategy. There were five teachers who responded with a general strategy (# 2, 8, 15, 19,
25). Therefore, instances of tacit knowledge could not be identified in those responses.
Each of those teachers was confident with his/her use of a general strategy in their classroom management. Their responses to questions 2 and 3 were about how they learned the general strategy and how they could help novice teachers learn such a strategy.

There were ten responses in the UC category (uncommon or opposite of what might be acceptable). Those experienced teachers find that what may work for them does not tie in with what would ordinarily be used by most teachers to deal with a classroom problem. Some of these experienced teachers may feel extremely comfortable doing the unexpected when dealing with classroom behaviors.

For example, #1 is a high school English teacher with 12 years of teaching experience. When a fight broke out in a hallway between two young men, he stepped between them and waited for them to stop fighting. It took seconds because neither one of the young men wanted to hit the teacher (he hoped). He then took the angrier of the two students to the office and sent the other student to class followed by another student. Eventually both students were brought to the office and were suspended. Ordinarily, teachers would refrain from stepping between two fighting students.

Teacher interview #13 is high school mathematics teacher with eight years of experience. While teaching a specific method, she realized that she didn’t really know how to proceed in the explanation so that all of the students would grasp the concept. She admitted that to the students, regrouped her plan, and was able to teach the concept well the next day. She felt that the students appreciated her honesty and they had fun cranking through the work the next day. Not all teachers are able to admit doubt in themselves.
Table 1

*Question #1 Categories for Student Behavior and Teacher Action*

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*Student Behavior Categories*  
*Teacher Action Categories*
4.1 Tacit Knowledge in Question #1 Responses

As mentioned previously, tacit knowledge is procedural (Sternberg, 1998) with condition – action components. That is, an action is carried out, but first some conditions need to be satisfied. When a procedure is considered to be tacit, it is the satisfying conditions component that is actually tacit while the action component is relatively explicit. Indeed, we can often see the action. Below are detailed analyses of three teachers’ responses to Question #1. Each analysis will include:

a) Quotes from teacher’s response
b) The action components of identified instances of tacit knowledge
c) Action components restated as capabilities
d) Inferred knowledge that supports the execution of the action components.

The inferred supporting knowledge usually takes on the form of classifications. To determine if conditions are satisfied, the teacher will be classifying aspects of the environment. With tacit knowledge, these classifications are likely to be automatic with little conscious deliberation. These classifications are also referred to as instances of pattern recognition. There are many instances of procedural knowledge. On one hand, thinking is quite deliberate and an individual teacher will follow a series of explicit “if-then” contingencies. On the other hand, the tacit side, “if-then” contingencies are automatic and teachers are often unable to make them explicit. In the following analyses, classifications are emphasized (i.e., satisfying the “if” conditions) that are likely to have occurred (automatically) so the teacher action could be carried out.
A student who was failing my class became loud, disruptive and argumentative with another student while I was trying to teach. I had to stop and tell him to be quiet. He became argumentative with me (this had happened several times before). I had him go sit outside my class in the hallway for five minutes. I finished teaching what I needed to explain to the rest of the class. Then I went out in the hall and talked with the disruptive student. He was given a choice to go down to the office and explain to the principal why he was kicked out of my class, or he could return to class and behave appropriately. He chose to return to class and behave. Later that day I called his mother. The student still gave me trouble off-and-on in later episodes, but we had an understanding that when I asked him to do something, he needed to do it.

**Actions:**

1) Teacher removed disruptive student from class for a short period of time, that is, had him sit in the hallway;

2) Then she held a one-on-one conversation with him during which time she gave him choices.
**Capabilities:**

1) When dealing with a student who has been habitually disruptive during class, able to determine if the student should be removed temporarily from class and directed to sit in the hallway.

2) During conversations with a disruptive student, able to openly offer reasonable choices to which the student would respond with the better alternative.

**Inferred knowledge that supports action components:**

Below are prerequisite classification capabilities that are inferred to support the two action components. The researcher is equating “satisfying conditions” with these classification capabilities.

**Classification prerequisites for Action #1:**

Based on prior argumentative history and disruptive behavior of the particular student, the teacher classified the situation as one for which a typical desist would not work.

The teacher classified the situation as too disruptive for other students and herself.

The teacher classified the student (and the situation) as one who would not cause further problems in the hallway.

**Classification prerequisites for Action #2:**

The teacher classified the situation with the student as one for which she would be likely to have a successful conversation (a judgment of her self-efficacy).

The teacher classified the situation as one in which the student would be likely to make an acceptable choice.

The teacher classified the situation as one for which actions taken are sufficient and do not need to be taken to another level.
Regarding the inferred supporting knowledge, several points need to be mentioned:

First, the supporting knowledge is inferred. There is not conclusive evidence that the teacher is able to carry out these classifications. However, the inferences are made based on Sternberg’s depiction of tacit knowledge as procedural (1998). So that before actions can be carried out, certain conditions have to be satisfied. As mentioned previously, classifying aspects of one’s environment can be considered how conditions are satisfied (Dunn, Taylor, Kleshinski, & O’Neal, 2009). In addition, that classifications precede actions is consistent with Gagne’s theoretical work in which classifications (conceptual knowledge) are prerequisite to rule using/problem solving (1985).

Second, these classifications are not based on careful reasoning with explicit criteria. Instead, they are based on pattern recognition which apparently occurs quite automatically. Third, in many of these interviews, it was clear that teachers’ actions were based on what they knew about specific students. Fourth, included in the pattern recognition is rapid self-assessment of one’s efficacy to carry out probable actions.

Teacher #6

Grade Level: 10

Years of Experience: 10

One day, my colleague gave an emotional student a detention.

This student responded poorly, throwing belongings around the room and smacking the desk. The co-worker called in a state of panic. As I had no students at the time, I rushed down the hall and was able to remove the student from the room.
I took him to the nurse, as he was bleeding, then I found another teacher to stay with him and the nurse so there would be more than one adult present. I then helped to properly clean up the classroom and helped the teacher get the other students back on task. I followed up with the nurse and the other teacher to ensure that the student was okay and filled out the school’s incident reports.

**Actions:**

1) Removed a volatile student from a colleague’s classroom who had asked for help.
2) Took the volatile (and bleeding) student to the nurse.
3) Helped the colleague get class back on task.

**Capability:**

In an emotionally-charged classroom situation in which a student is acting out with behaviors potentially detrimental to self and others, the teacher is able to remove the student from that situation with minimal disruption and no further violence.

**Inferred knowledge that supports action components:**

Classification prerequisites for Action #1:

The teacher classifies the situation as one from which the student needs to be removed.

The teacher classifies the situation as one from which he would be able to successfully remove the student (self-efficacy).
Satisfying conditions – An emotional student was given a detention by a teacher and a fellow teacher made a judgment about the severity of the situation by physically removing the emotional, angry student from the classroom, which implies that removing some angry students from a classroom, in some situations, will stop the problem. This was a quick decision to cease the disruption and further injury to the student or others. This teacher’s self-assessment of her ability to respond rationally in this context is evident – self-efficacy.

Teacher #16
Grade Level: 10
Years of Experience: 10

In the chaos of classroom activities such as simulations (when there are many activities taking place, but students need to be mindful of several things taking place around them), it is often important to gain and focus the students’ attention before allowing events to proceed. Thinking about a multi-day, highly complex simulation of the French Revolution, I can recall needing to stop everything from happening and waiting until all students stopped moving, stopped talking, and were looking at me. Without their full attention, the directions were being lost and the activity was being devalued to the point of becoming harmful to their understanding of the historical events and issues.
**Action:**

During a complex classroom simulation about the French Revolution, the teacher stopped everything when students were too off task and then resumed the simulation when he had their full attention.

**Capability:**

During complex classroom activities (e.g., a very involved simulation) when students are not getting what they should out of the experience, able to stop the activity, regain students’ attention, and get them back on task.

**Inferred knowledge that supports action components:**

Teacher classified the context as involving too much off-task behavior for an effective classroom simulation.

Teacher classified the context as beyond his capability to maintain an effective classroom simulation.

Teacher classified the situation as one for which he could regain enough control to resume a complex classroom simulation (self-efficacy).
4.2 Analyses of Responses to Questions 2-5

**Question #2:** How did you learn to do that? Did anyone help you?

Below are the major sources of learning/helping in teachers’ responses and the number of teachers mentioning these sources.

- Colleague/Mentor – 13
- Experience – 12
- Class/Books – 9
- Common Sense – 4
- Don’t Remember – 1

The numbers add up to more than 29 because some teachers mentioned more than one source. Many teachers indicated that what they had learned was a form of tacit knowledge even though that is not the term they used. For example a Special Education teacher with nine years of experience said:

> Sometimes you have to stop and think – why are these students so upset and break things down in your mind as to different scenarios that may be holding them back in their minds. It is going backward to go forward.

**Question #3:** How could you help novice teachers learn to do that?

- Communication/Discussion – 21
- Role play-Model – 8
- Mentoring – 6
- Observation – 4
Many teachers remembered having lengthy discussions with their own cooperating teachers and have used that method with their own student teachers or would use such a method if they have a student teacher in the future. The following quote by a mathematics teacher with 30 years of experience illustrates this point:

Novice teachers can gain expertise by talking to other teachers in all school systems. If a difficult situation arises and you aren’t sure how to handle it, ask for help. Sometimes just talking about it to another colleague helps you discover the best way to resolve a conflict.

**Question #4:** Tell me about a situation regarding classroom management or classroom discipline that you did not handle too well.

The responses to this question were quite varied and somewhat surprising. This particular question did not address a specific research question (Dunn & Lozinski, 2005). It was because of interest (perhaps intrigue) that this question was asked.

Of the 29 responses, 15 included acts of commission (basically yelling and/or losing control of their emotions); 9 included acts of omission (they often did not know how to handle a situation); 4 included issues of time constraint in their classroom; 1 indicated lack of supervision for a student; 2 stated other issues unrelated to the study. Some of the teachers stated that they were embarrassed by their outbursts. Most of the teachers remembered the situations and their reactions clearly even though many of them
occurred years ago. The following quotes illustrate the importance of these classroom management events to teachers:

Interview #27

Grade Level: 9
Years of Experience: 13

It’s difficult to admit, but I once kicked a student’s desk.
I was at my wit’s end and let this student get the best of me. After weeks of this student’s insubordination, and instead of dealing with him “correctly” earlier and with the assistant principal, I blew a cork. Not a good memory.

Interview #7

Grade Level: 10
Years of Experience: 16

Recently the dance team ordered t-shirts for younger students.
When I handed them to the girls, they all complained, whined, and pitched a fit because they weren’t tight enough. I went off, and started yelling about how ungrateful they were and then worked them really hard! Of course, I had parents call and complain to the administration about my yelling. I might have used the work “brat.”

**Question #5:** How could you help novice teachers learn about such situations?
Below are the sources of help that teachers mentioned and the number mentioning such sources:

Discussion – 18
Mentoring – 9
In-school Resources – 7
Modeling/scenarios – 4
Seminars/Stress Management – 2

The following quotes from a history teacher with 12 years of experience and a career teacher with 16 years of experience express issues brought up in response to Question #5:

Have new teachers observe other teachers in their classroom situations; hold discussions with veteran teachers; volunteer to work with students from many different ages, circumstances; compare and contrast notes; read up on current literature or methodologies.

Recognize they are going to have situations like this. They are going to lose their cool, but they can learn and reflect on a better way for the next time. I think that stress management and human development must be required more frequently in education. Mentors could be used and novice teachers should be given opportunities to vent, learn, shadow, and feel supported by administration.
Chapter 5

Discussion and Recommendation

The purpose of this study was to identify instances of tacit knowledge used by secondary school teachers in their classroom management experiences. This study also replicated an earlier study conducted by Dunn and Lozinski (2005). Teachers’ stories were used to illustrate the tacit knowledge that was used and to show that it is procedural, that is, with condition – action components. This is consistent with Sternberg’s description of tacit knowledge (1998). The action components were identified in each story and the actions were restated as capabilities which helped to determine the conditions component. In carrying out procedures, individuals must determine if the conditions are satisfied within a specific situation. If the knowledge used is tacit, satisfying conditions are assessed automatically by pattern recognition. It is much like recognizing a new example of a concept that is an instance of classification. The analyses in this study focused on inferred classifications that most likely preceded the action component.

It is not the intent of this research to claim that once this knowledge is identified, it can then be literally taught to novice teachers. It is believed, though, that efforts to model, discuss, or simulate tacit knowledge can help prepare novice teachers by planning learning experiences for novice teachers and influencing novice teachers’ behavior during teaching and subsequent reflections about their teaching.
The first example in the Results section dealt with a sophomore teacher and her ability to remove a disruptive student from the classroom and also give him choices. It would be helpful for novice teachers to have experience in dealing with disruptive students. This is likely to happen during actual teaching experiences. The novice teacher, however, could also observe more experienced teachers deal with such situations, and such examples could be topics for discussion and reflection between a mentor and novice. The mentor must be a person who can develop a relationship with the novice teacher and not simply be the next experienced on the mentor list. The inferred knowledge that supports the action component included in the scenario classifies the situation as the teacher having previous knowledge of the student’s behaviors and the benefit of hallway placement. Mentoring teachers could suggest that novice teachers reflect on the situation for problems encountered in the classroom. While most cooperating or mentor teachers would likely give directions to novice teachers in some cases, this may not always be the case.

In another scenario with Teacher #9, a volatile student was removed from a classroom after a colleague asked for Teacher #9’s help. This teacher’s self-assessment of her ability to respond rationally in the situation is evidence of self-efficacy. This teacher is comfortable in various situations and used knowledge that she honed over the years working with hundreds of students in various situations. This teacher was able to ascertain whether or not it was safe to remove an angry/injured student from a classroom without further outbursts from the student.

Many experienced teachers might be able to carry out capable solutions to either of the situations mentioned. No two teachers will have the same experiences, so it is
unlikely that the types of environmental antecedents and students’ behaviors that teachers are able to classify as potentially problematic will be the same. If teacher experiences were similar, it is likely that experiential knowledge would be more explicit and more acquiescent to direct instruction to novice teachers.

This knowledge is tacit, though, and while we can not teach it directly, we could help novice teachers develop the capability. The best recommendation would be to arrange for experienced and novice teachers to view classrooms and compare their observations. After comparing notes, they should look at what the experienced teachers responded to and what the novice teachers concentrated on in the observations. Such observations should be topics for further discussion in student teaching seminars in regard to the potential stages of the capability of detecting classroom behaviors.

The tacit knowledge analysis procedures discussed allows for careful planning and design of educational experiences for novice teachers but still provides for individualized knowledge in authentic classroom environments. With No Child Left Behind laws, high quality instruction, research-based instruction, Response to Intervention (RTI), and continuous progress monitoring in today’s classrooms, novice teachers are faced with many opportunities and challenges with school students and curricula. By having the know-how to establish and maintain classroom management, the task is never daunting.
References


